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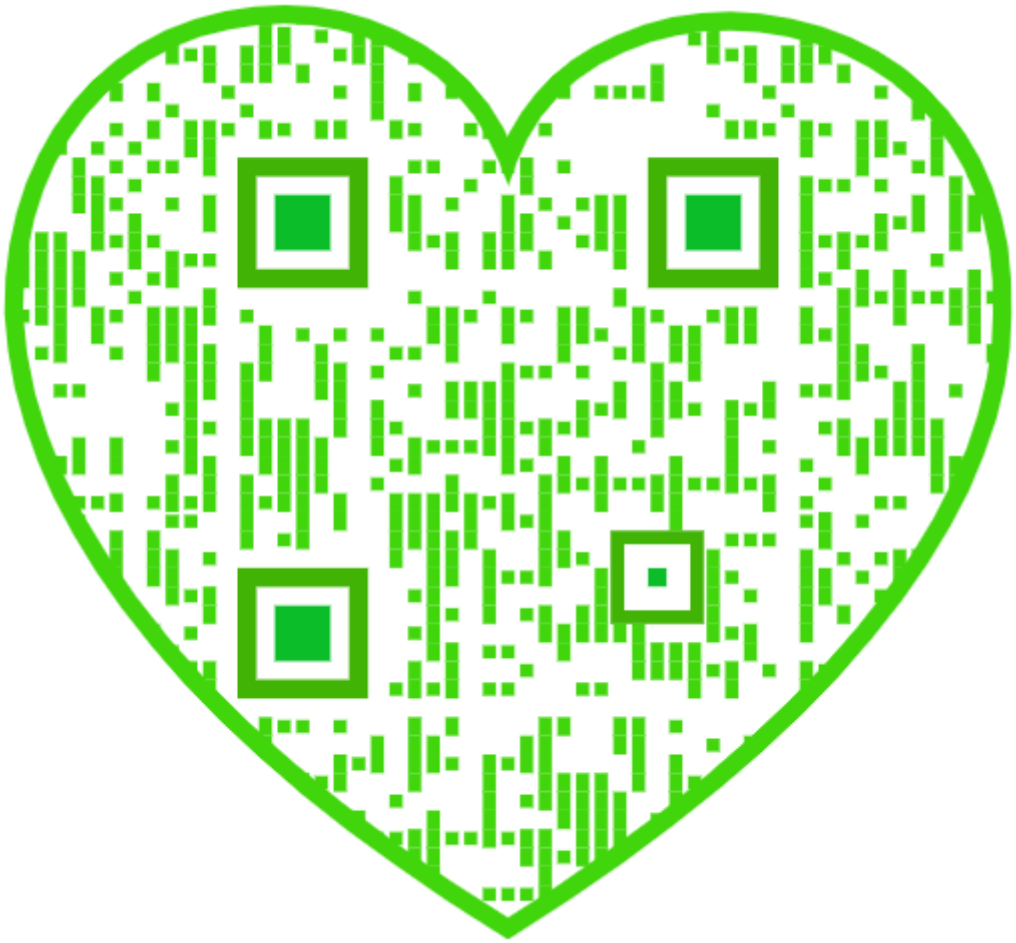
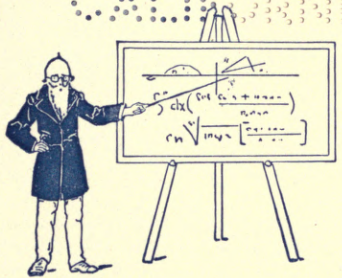


ASTRONOMY FROM A DIPPER

ASTRONOMY FROM A DIPPER

By Eliot C. Clarke

WITH CHARTS BY THE AUTHOR



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Published October 1909

THIRTEENTH IMPRESSION

TO MY GRANDDAUGHTER

ALICE DE VERMANDOIS WARE

A Nova, who first graced the celestial universe with her presence on the day that this monumental astronomical work was accepted by its publishers.

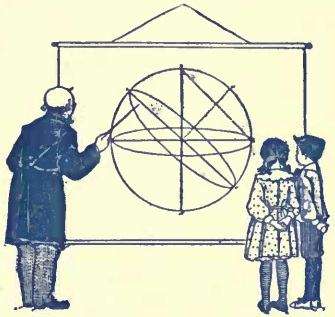
NOVA BOSTONIAE

From observation 24 hours after first appearance

416572

PREFACE

To know the chief stars and constellations makes the heavens friendly, and one looks at them with delight instead of with unseeing eyes. To call the stars by the names used by Job and Homer stimulates the imagination. I assume that most persons would like to learn this if they could do it without much effort. There are numberless maps and text books that profess to assist to such knowledge; but, usually, they fail to do so because they are prepared by learned persons, who try to teach too much and do not appreciate the difficulties in the way of beginners. A man with slight knowledge, little more than his pupil, makes the best instructor. From this viewpoint I am preëminently fitted to be a teacher.



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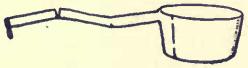
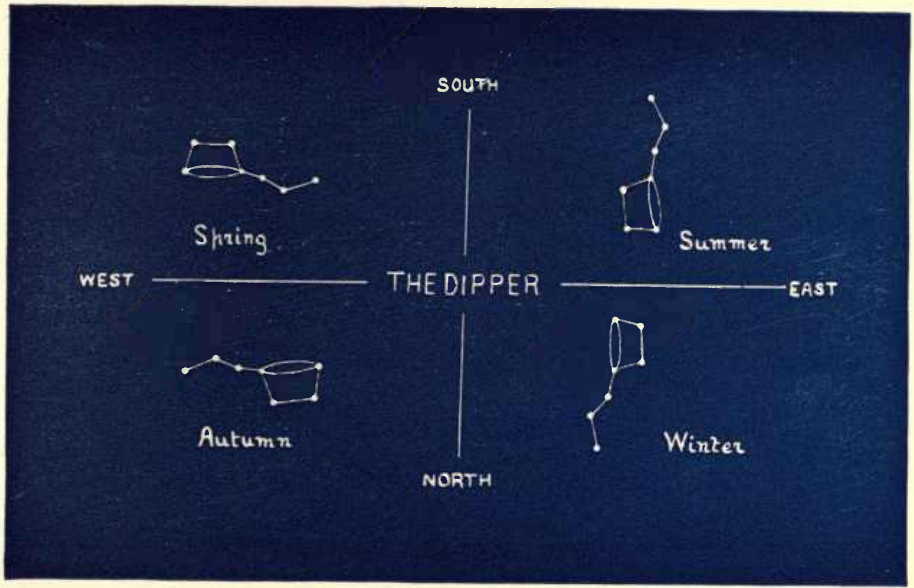
I

THE DIPPER

UNIV. OF CALIFORNIA

It is the first step that costs. I don't allude to buying this book, but to learning this first lesson. It is necessary to know the Dipper so that it may be used as a starting-point by which to find the other constellations. It may be seen in the northern heavens, high up during the first half of the year and near the horizon during the rest of the year. As indicated by the chart opposite, the aspect varies with the season. Moreover, you may see it in one position as you go out to dinner and in a different one as you return from a dance late the same night. This is confusing, I admit. The real name of the constellation is Ursa Major, The Great Bear, but it does not look so much like a bear as it does like a dipper. The handle forms the bear's tail, and real bears have no tails, whereas old dippers often have such handles.



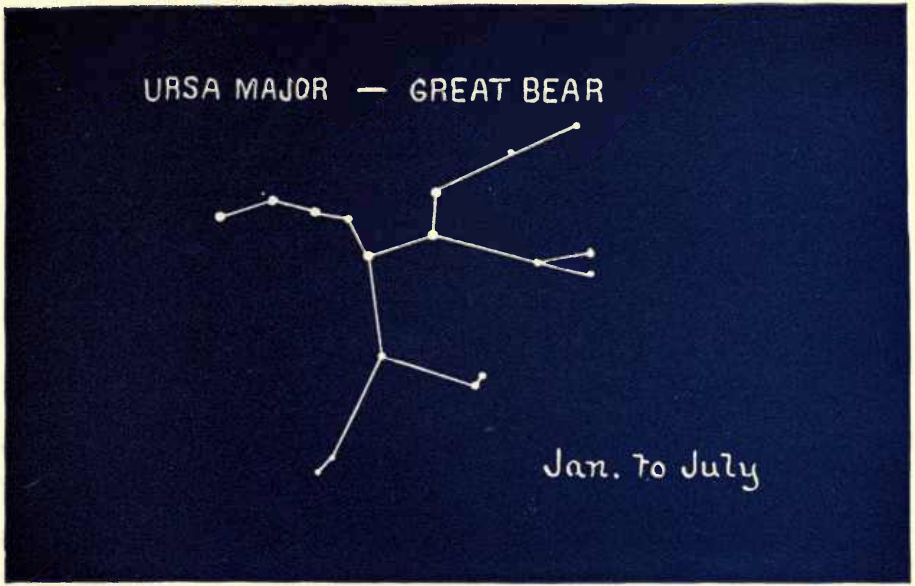

SOUTH
Spring
Summer
WEST
THE DIPPER
EAST
Autumn
Winter
NORTH

II

URSA MAJOR—THE GREAT BEAR

The chart opposite shows some other stars belonging to the Great Bear. Notice that from each corner of the bowl of the Dipper imaginary lines may connect outlying stars of the constellation to the main body. These should be learned, as they will be referred to again. The star at the point where the handle is bent is a double star. Most persons can make this out with the naked eye.

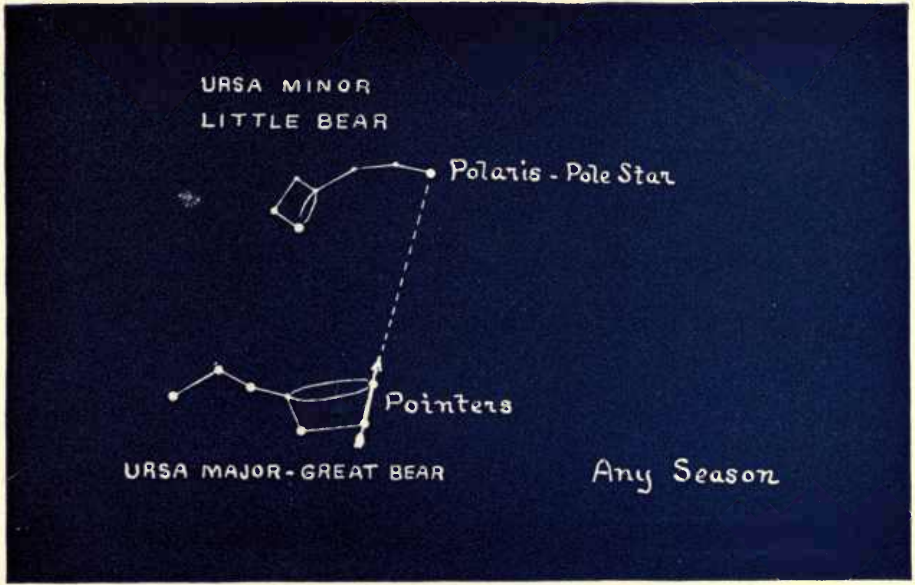
The months during which the constellations to be studied can be seen best are indicated on the charts. This assumes that you look at them at about nine o'clock. At eleven o'clock you can study them one month earlier than those given; at one o'clock, two months earlier, and so on. From late summer to early winter portions of the Great Bear are below the northern horizon, or so near it that they cannot be seen. The bowl, however, almost always is visible.


URSA MAJOR — GREAT BEAR
Jan. to July

III

URSA MINOR—THE LITTLE BEAR—POLARIS

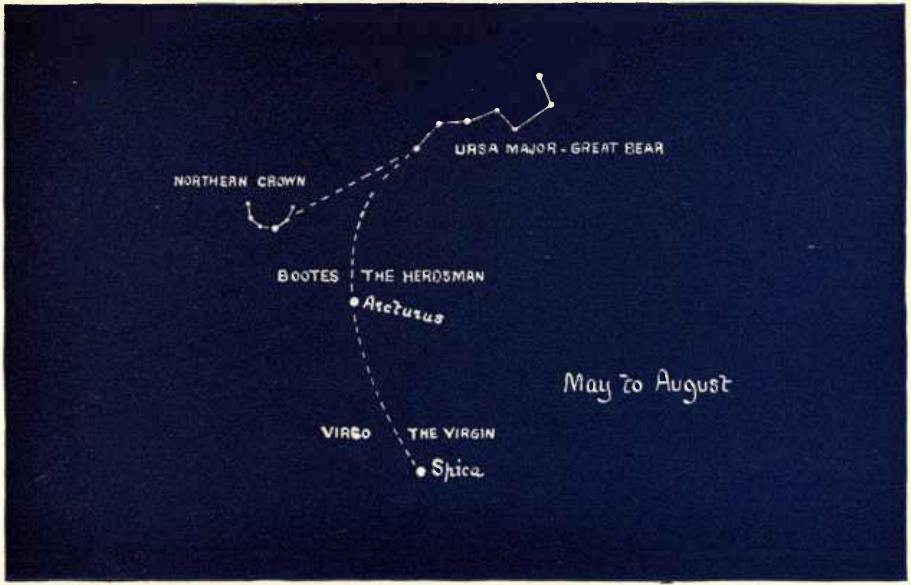
The two stars in the side of the Dipper, opposite to the handle, are called "The Pointers," because they point to the Pole Star, or North Star. This star is nearly due north, and it is the only star in the heavens that does not seem to change its place. All the others revolve about it as a centre. The star's name is Polaris, and it belongs to the constellation Ursa Minor, The Little Bear. Like the Great Bear, this constellation resembles a dipper more than it does a bear. Some of the stars are rather faint, but the dipper can be made out. The Little Bear also has a long tail formed by the handle of its dipper, and Polaris is at the extreme end. As the end of the tail is fixed and the bear is swung around by it daily, possibly this accounts for its length. A few thousand years ago Polaris was not the pole star, nor will he be a few thousand years hence. Then a new and revised edition of this text book will be needed.


URSA MINOR
LITTLE BEAR
Polaris - Pole Star
Pointers
URSA MAJOR - GREAT BEAR
Any Season

IV

ARCTURUS — SPICA — NORTHERN CROWN

Look at the handle of the Dipper, and imagine a curve passing through it and prolonged about as far as the total length of the Dipper. It there will meet Arcturus, an orange-red star and one of the brightest. Continue the curve about as much farther, and it meets Spica, a pure-white first-magnitude star. Arcturus is in the constellation Boötes, The Herdsman, and Spica is in The Virgin. It is not necessary to consider now the fainter stars in these constellations. If the handle of the Dipper were straightened, it would point to the near-by constellation Northern Crown. This may be recognized by its resemblance to half of a crown. Without much experience with such objects, I should call it a tiara, with a bright gem in its middle. Perhaps the Virgin is looking at the tiara. Probably the Herdsman is looking at the Virgin.

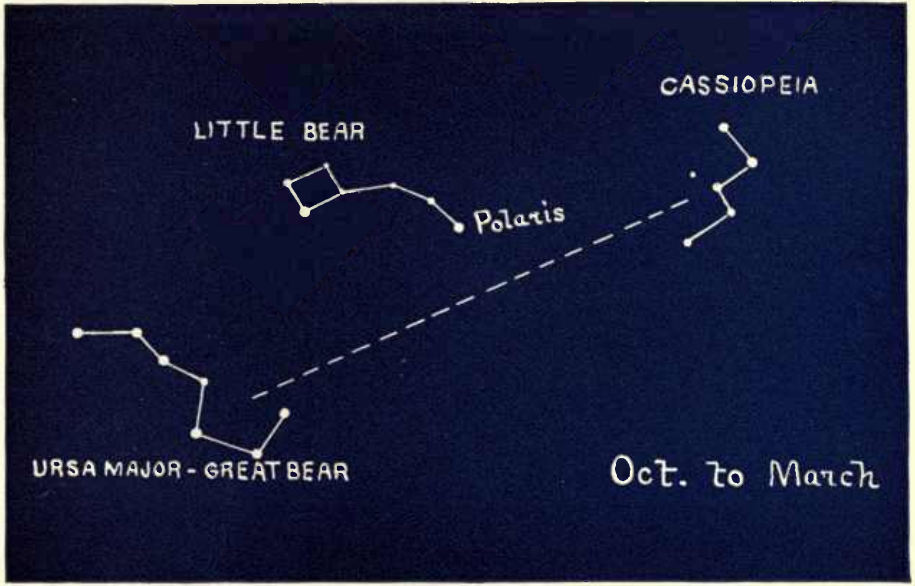

URSA MAJOR - GREAT BEAR
NORTHERN CROWN
BOOTES THE HERDSMAN
Arcturus
May to August
VIRGO THE VIRGIN
Spica

V

CASSIOPÆIA

With the Pole Star and the Dipper you can find Cassiopæia. Polaris is halfway between the others, so that Cassiopæia may be found as indicated by the chart. It can be recognized because its chief stars, all bright ones, make a fair letter W.

The constellations can be studied best on moderately dark nights. When the moon shines brightly it is hard to see them. The lights of a city cause trouble, also. Do not expect extreme accuracy in the charts. The stars being dotted over the inside of an inverted bowl, it is impossible to make them look just right on a flat surface. Moreover, the constellations as shown on the charts look too small, with their stars crowded together. This is because real stars have no apparent size, but on the charts they are drawn very large, to indicate different degrees of brightness.

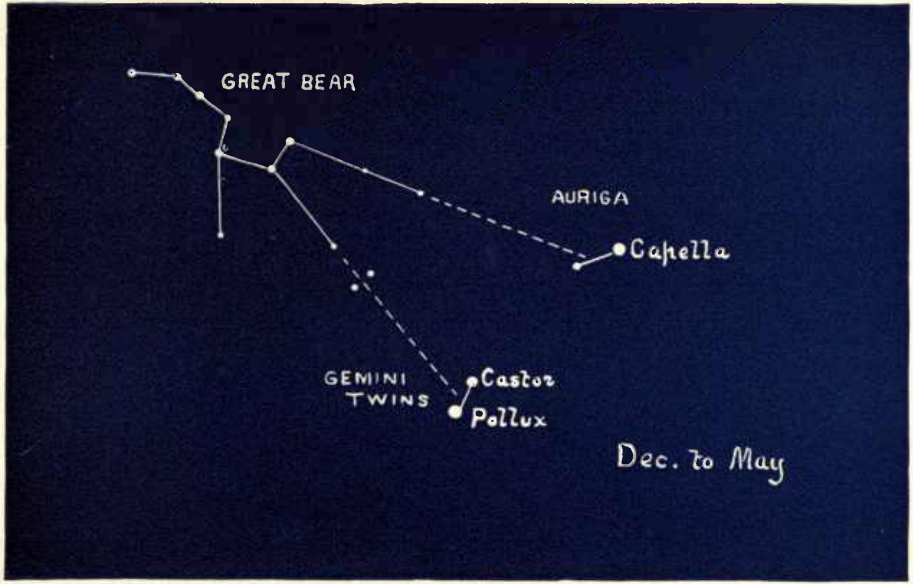

CASSIOPEIA
LITTLE BEAR
Polaris
URSA MAJOR - GREAT BEAR
Oct. to March

VI

CAPELLA — THE TWINS

If you prolong the line which connects the upper front star of the Dipper with the outlying stars of the Great Bear, it will run into the constellation Auriga, The Charioteer. The chief star in Auriga is Capella, a yellow star of great brilliancy. It is said to be 100 times larger and brighter than our sun. Near to it is a noticeable second-magnitude star. The name Capella means The Kid, but its likeness to a kid is not striking.

At my farm I have Angora kids, and their demeanor does not suggest the dignity and serenity that are attributes of Capella. Prolonging the line connecting the front bottom star of the Dipper with its outlying stars, this soon meets the constellation Gemini, The Twins. The chief two stars of this constellation are the twins themselves, Castor and Pollux. Castor is white and Pollux yellow. Both have been called first-magnitude stars, but Castor is not quite so bright. It is better not to make any distinction between twins.

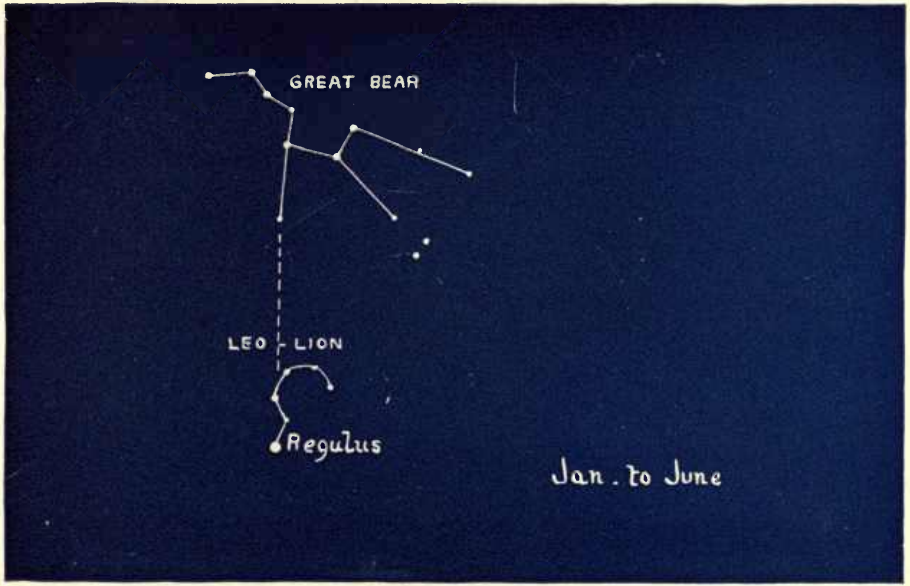

GREAT BEAR
AURIGA
Capella
GEMINI
TWINS
Castor
Pollux
Dec. to May

VII

REGULUS—THE LION

If you prolong the line connecting the bottom star of the Dipper, under the handle, with its outlying star, this line soon runs into the constellation Leo, The Lion. The chief stars of this constellation do not form a good image of a lion, but they do make an excellent sickle. Once recognized, this never is forgotten. The first-magnitude star at the end of the handle of the sickle is Regulus.

There being little to say about Regulus, I will here suggest that, having learned three or four of the constellations, a tactful person may permit himself the pleasure of showing off his knowledge and instructing another. Be sure that she runs no risk of taking cold or of stumbling while gazing upwards.

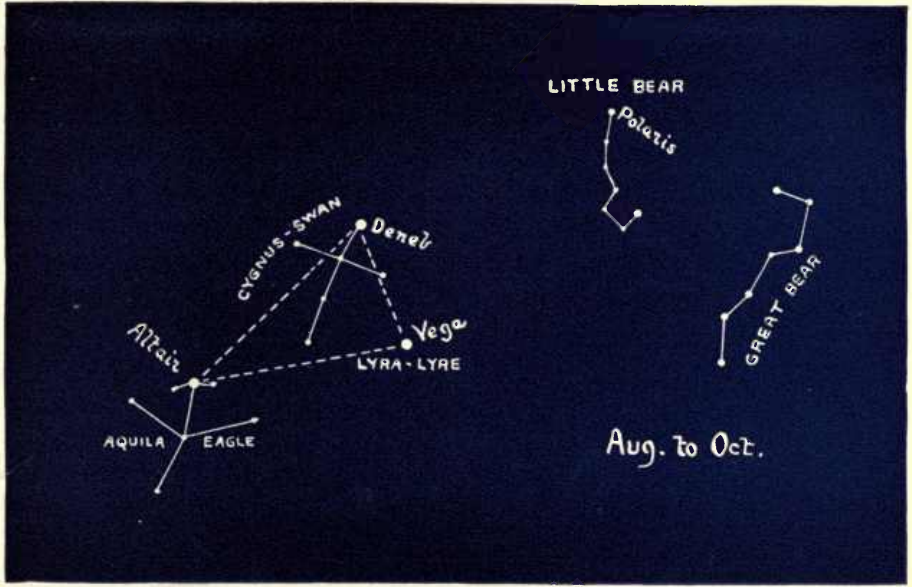

GREAT BEAR
LEO - LION
Regulus
Jan. to June

VIII

VEGA—DENEB—ALTAIR—THE SWAN AND EAGLE

This lesson is somewhat difficult. In front of the open bowl and the handle of the Dipper may be seen a large triangle formed by the three first-magnitude stars, Vega, Altair, and Deneb. Vega, or Alpha Lyræ, Alpha of the Lyre, is a very brilliant white star on the edge of the milky way nearest to the Dipper. Altair, of the Eagle, also white, is on the further edge of the milky way and has two stars near to it, one on each side. Deneb, of Cygnus, The Swan, is in the milky way and is not so bright as the others. It can be recognized because it is at the top of a large and symmetrical cross. Cygnus also makes a good swan flying towards the Eagle, with outstretched neck and wings; Deneb being in its tail.

My cousin, Mr. Percival Lowell, an astronomer, tells me that in about ten thousand years Vega probably will be the pole star. I have not verified this, and should not be held responsible if it does not turn out so.

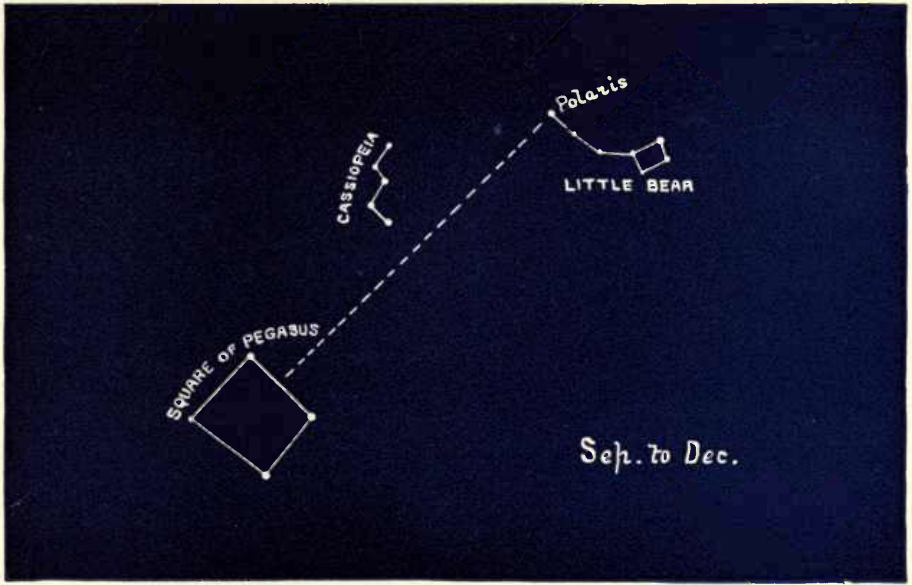

LITTLE BEAR
Polaris
CYGNUS - SWAN
Deneb
Vega
Altair
LYRA - LYRE
AQUILA
EAGLE
GREAT BEAR
Aug. to Oct.

IX

GREAT SQUARE OF PEGASUS

Find the North Star and also Cassiopæia. The latter constellation lies about half way between Polaris and the Great Square of Pegasus; not exactly between, but as indicated by the chart. This square can be recognized because it is symmetrical, the stars at its corners are bright, although not of first magnitude, and there are no noticeable stars within the square, or any bright ones near to it. It belongs to the constellation Pegasus, The Flying Horse. It does not look much like a horse, but it does suggest a box stall in which a horse could be kept.

In using the charts hold them over the head, twisting them round until the known constellations assume the positions in which you see them. Then the others will be in their proper places.

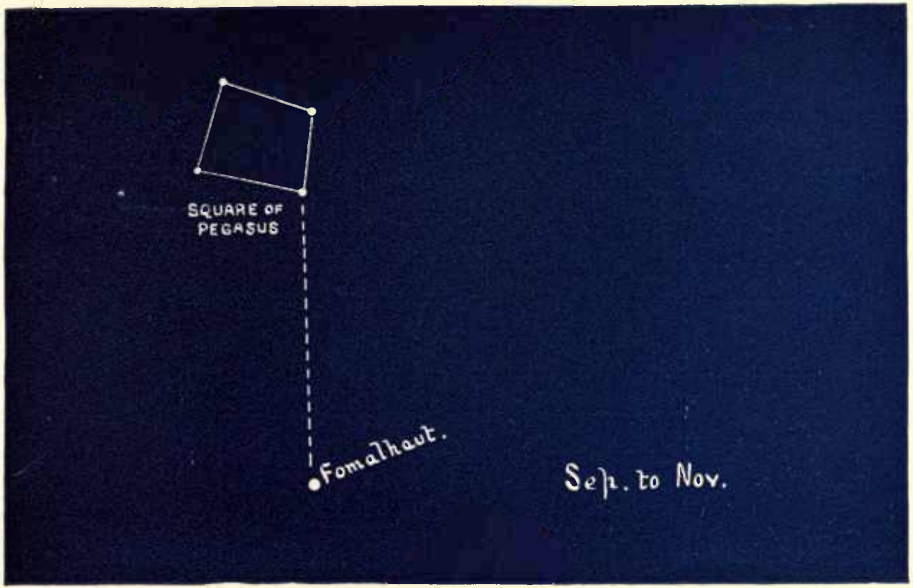

Polaris
CASSIOPEIA
LITTLE BEAR
SQUARE OF PEGASUS
Sep. to Dec.

X

FOMALHAUT

The Square of Pegasus may be made useful in finding the first-magnitude star Fomalhaut in the Southern Fish. In the latitude of Boston, where I write this,

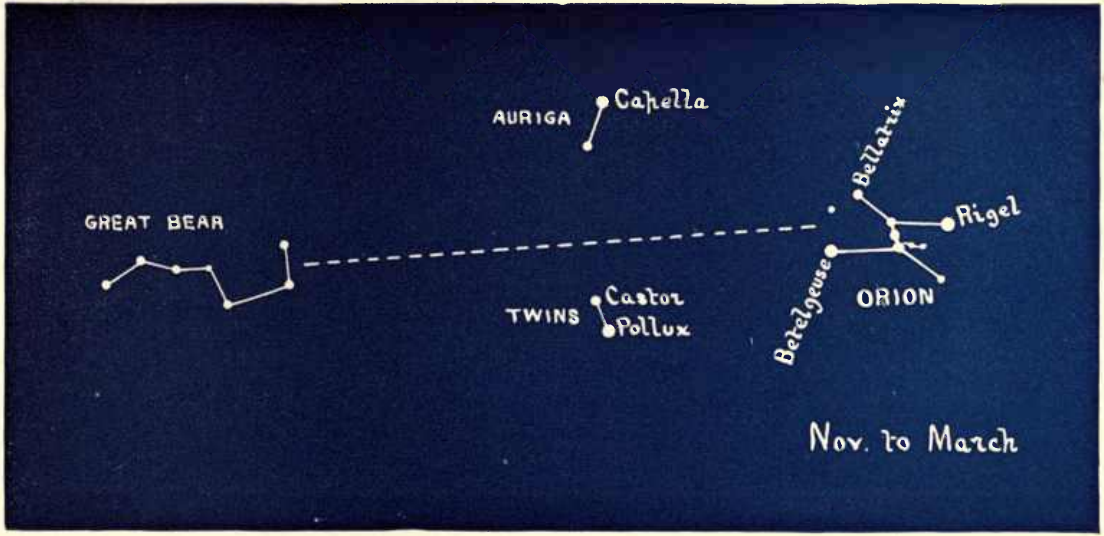
Fomalhaut rises above the southern horizon during the fall months only; even then it is so low that it is not very bright. In the Southern States it is more noticeable. In England it hardly is visible. The two western stars of the Square point down toward it. Should any one wish to observe Fomalhaut under more favorable conditions, he can do so by going to South America or Australia. Moreover such a journey will enable him to see southern constellations not mentioned in this book, which shows only those visible in northern latitudes.


SQUARE OF
PEGASUS
Fomalhaut.
Sep. to Nov.

XI

ORION — BETELGEUSE — RIGEL

If a line pass across the sky from the bowl of the Dipper, between The Twins and Auriga, it will meet, near to the southern horizon, the constellation Orion. This should not be difficult to find, because it is the brightest, most conspicuous constellation in the heavens. The names of its chief stars are given on the chart opposite. Betelgeuse is orange-red and of first magnitude. Bellatrix is yellow and not quite of first magnitude. Rigel is a very brilliant bluish-white, first-magnitude star. Note the three second-magnitude stars forming Orion's sword belt, and their symmetrical arrangement; also the short sword hanging from the belt. Orion's head is formed by a few rather faint stars a little above Betelgeuse and Bellatrix.

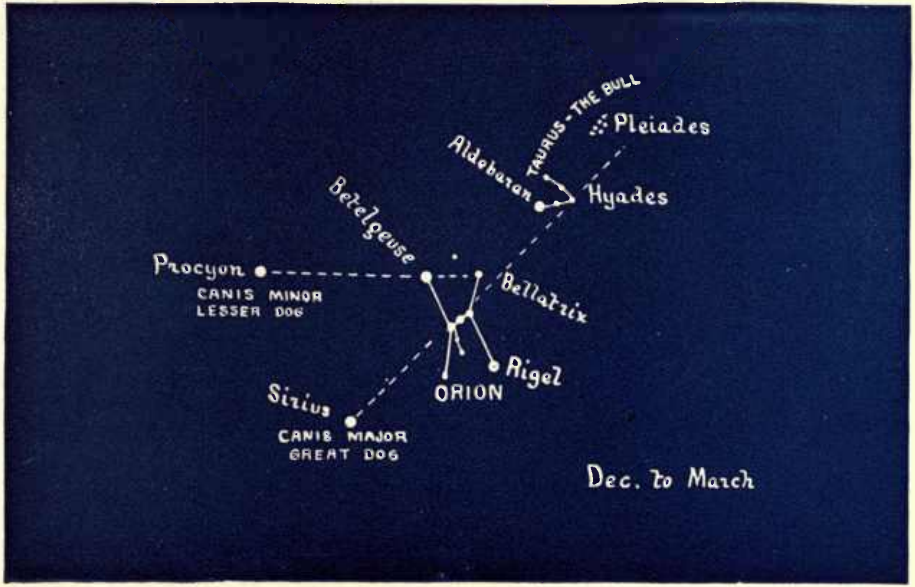

AURIGA
Capella
GREAT BEAR
TWINS
Castor
Pollux
Bellatrix
Rigel
Betelgeuse
ORION
Nov. to March

XII

PROCYON — SIRIUS — ALDEBARAN — PLEIADES AND HYADES

A line from Bellatrix through Betelgeuse goes towards Procyon, of Canis Minor, The Lesser Dog. The line of the belt prolonged to the right comes near to the rose-red star Aldebaran, in Taurus, The Bull. The same line continued further comes near to the Pleiades, also in the Bull. Most persons see six of these. The seventh, the lost Pleiad, can be seen by some persons. There are more, fainter, stars in this group, and some persons claim ability to see eight or ten. It is a matter of taste. I, who suffer from a New England conscience, see only six. Another group, of which Aldebaran forms one, is The Hyades. These form a letter V. To the left Orion's belt points towards Sirius,

the Dog Star, in Canis Major, The Great Dog. Sirius is several times as bright as any other star. This is because it is nearer to us than are most of the stars. Probably its distance is only about fifty million millions of miles.

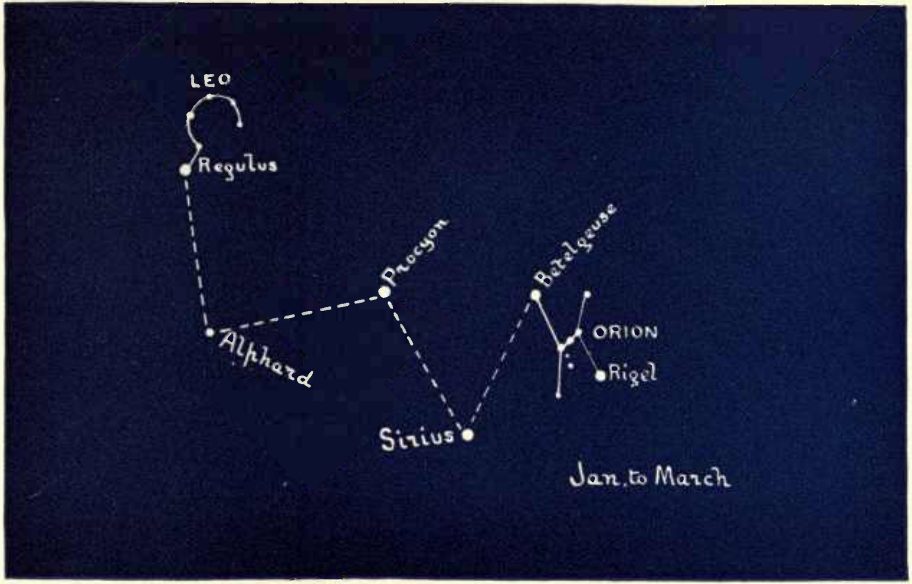

TAURUS - THE BULL
Pleiades
Aldebaran
Hyades
Betelgeuse
Procyon
CANIS MINOR
LESSER DOG
Bellatrix
Rigel
ORION
Sirius
CANIS MAJOR
GREAT DOG
Dec. to March

XIII

ALPHARD

In winter and early spring a large and fairly symmetrical letter W is formed by five of the brightest stars in the southern sky. These stars are Betelgeuse, Sirius, Procyon, Alphard, and Regulus. Alphard is the chief star of the constellation Hydra. It is not quite of first magnitude, but is noticeable because it shines alone, there being no stars near to it. For that reason the Arabs named it El Fard, The Lonely, or Solitary, One.

Some years ago I bought a pair of Kentucky saddle-horses. They had been reared together. On their journey to Boston both caught pneumonia. One of them died, and we feared the other also would die, from grief at the loss of his mate. So we named him Alphard. Thus a knowledge of astronomy helps in the simple needs of everyday life.


LEO
Regulus
Procyon
Betelgeuse
ORION
Alphard
Rigel
Sirius
Jan. to March

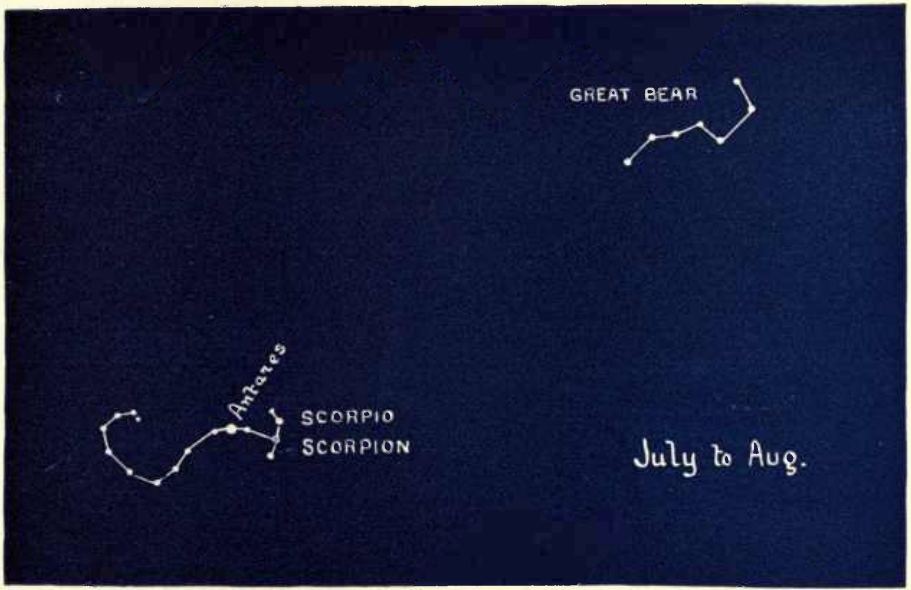
XIV

THE SCORPION—ANTARES

The most brilliant summer constellation is The Scorpion. The handle of the Dipper points towards it. This constellation does not rise much above the southern horizon, and it looks more like its name than do most constellations.

Its tail curls up over its back, quite after the manner of real scorpions. The most noticeable thing about it is Antares, its chief star, which is the reddest of all the first-magnitude stars. In the northern part of the United States the whole Scorpion does not remain long above the horizon. But Antares itself may be seen for about five months. Sometimes it is called Cor Scorpionis, The Heart of the Scorpion.

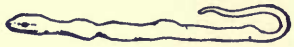
In comparing these charts with the heavens at night, an electric flash-light will be found convenient.

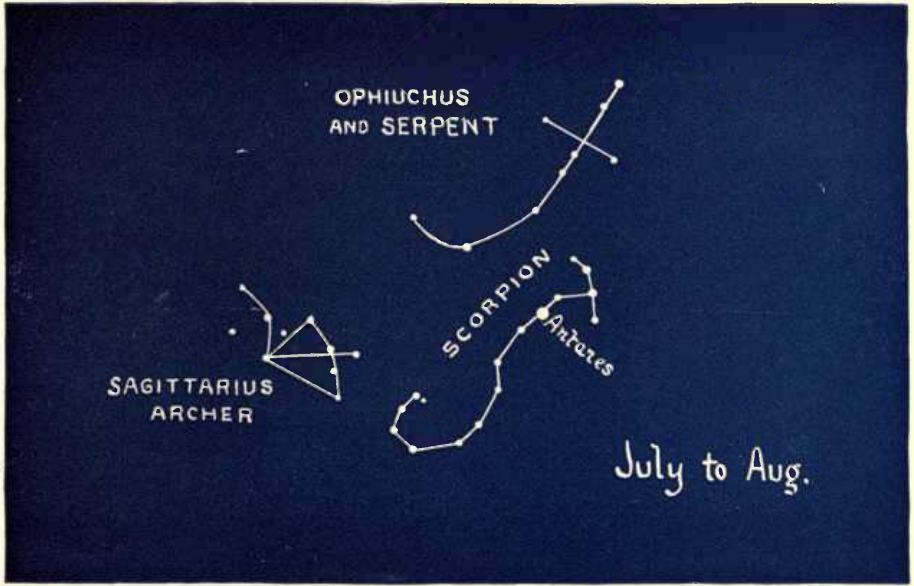

GREAT BEAR
Antares
SCORPIO
SCORPION
July to Aug.

XV

SAGITTARIUS — OPHIUCHUS AND SERPENT

To the east of the Scorpion, behind its tail, is the constellation Sagittarius, The Archer. This contains no very bright star, but may be recognized because it furnishes a good imitation of a bow with an arrow aimed at the Scorpion. I see two bows, one behind the other, the rear one having a broken arrow. Above the Scorpion is the double constellation Ophiuchus and The Serpent. It always is spoken of in this way, because only an expert astronomer can tell which stars belong to Ophiuchus and which to The Serpent. It seems as if the Serpent must have swallowed Ophiuchus; otherwise we cannot account for the inextricable mingling of their parts. The chart opposite shows only a small part of the constellation that resembles a scimitar. All the neighboring stars belong to this constellation, but none of them are conspicuous.



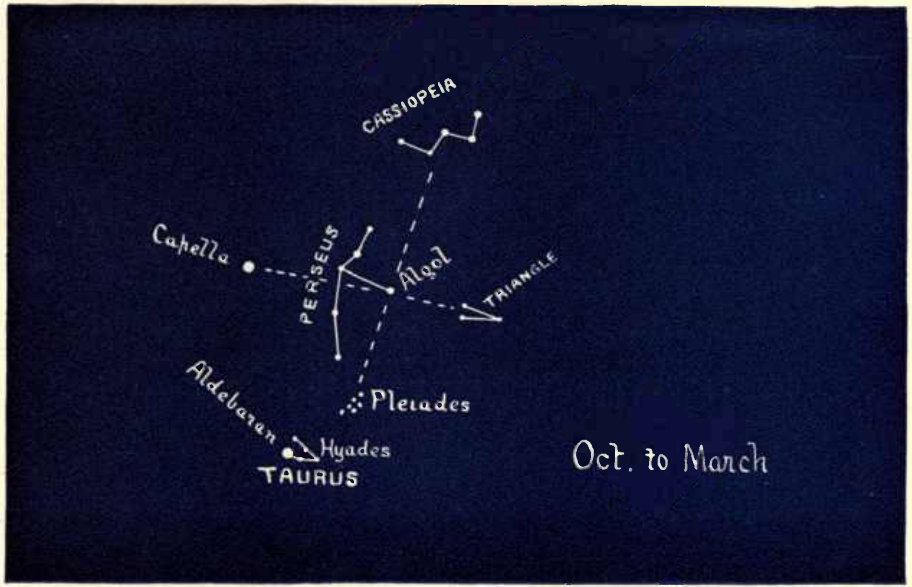

OPHIUCHUS
AND SERPENT
SCORPION
Antares
SAGITTARIUS
ARCHER
July to Aug.

XVI

PERSEUS—ALGOL

The former charts have shown all of the first-magnitude stars and most of the chief constellations. These cover the heavens so well that any other constellations or stars can be found by the help of a map of the sky. Suppose you wish to look for Perseus with its chief star Algol. You will find that it lies about half way between Taurus and Cassiopæia, which you have learned. Algol, Arabic El Gol, The Demon, is interesting because for two and one half days it is of the second magnitude. Then for four and one half hours it fades till nearly invisible. In four and one half hours more it regains its brightness. It has a dark companion revolving about it. So in waltzing a black-coated partner might eclipse a radiant beauty in white.

How brief is life as one looks back on it! It seems but yesterday that I was pointing to Algol, and looking at an upturned face, white in the starlight. And now—Ah! it was so long ago.


CASSIOPEIA
Capella
PERSEUS
Algol
TRIANGLE
Pleiades
Aldebaran
Hyades
TAURUS
Oct. to March

XVII

THE PLANETS

In studying the heavens you will see very bright stars that seem to belong nowhere, but wander about vaguely. These are planets, and they are very annoying. A planet thus seen will be either Venus, Mars, Jupiter, or Saturn. If the planet be red it is Mars, if yellow, Saturn. If it be extraordinarily bright, probably it is Venus, but if more than forty-five degrees from the sun, it is Jupiter. Viewed through a telescope, if it looks like the moon when not full, it is Venus: if it have moons but no ring, it is Jupiter: if it have a ring, it is Saturn: if it have canals — but, probably, you will not see these.

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